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REPORTS OF ORIGINAL INVESTIGATIONS

A "swing room" model based on regional anesthesia reduces turnover time and increases case throughput

Un modèle de « salle en rotation » basée sur l'anesthésie régionale réduit le temps entre les cas et augmente le volume de cas

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Abstract

Purpose *Our centre recently implemented a new ambulatory care model featuring two alternate regional anesthesia "swing" operating rooms (RA-SRs) managed by a single anesthesiologist. We hypothesized that this model would be associated with decreased turnover times and improved recovery profiles when compared with a traditional model with a single operating room using general anesthesia.*

Methods *We conducted a retrospective cohort study of 164 patients scheduled for hand and wrist surgery who were treated in the RA-SRs under brachial plexus blockade, and we compared the findings with a matched historical control group of patients who underwent general anesthesia in a single operating room (GA-OR). The primary endpoint was room turnover time. Secondary endpoints included home discharge time, postoperative interventions for nausea and pain, and number of cases possible per eight-hour day.*

Results *Patients in the RA-SR group had faster turnover times than patients in the GA-OR group (median [interquartile range]: 15 min [8-22] vs 54 min [49-61], respectively) as well as faster home discharge times (28 min [20-46] vs 156 min [118-215], respectively) ($P < 0.0001$). In the RA-SR group, postoperative antiemetics were used in 3/164 patients (2%) vs 28/164 (17%) in the GA-OR group ($P < 0.0001$), and opioids were used in 1/164 (0.6%) vs 132/164 (80%), respectively ($P < 0.0001$). The median number of daily cases possible in the RA-SR group was 56% greater than in the GA-OR group (8.4 [7.5-9.4] vs 5.4 [5.1-5.8], respectively; $P < 0.0001$).*

Conclusion *Compared with a traditional model using general anesthesia in a single operating room, the implementation of a model using regional anesthesia with two swing operating rooms was associated with reduced room turnover times, improved recovery profiles, and a higher case throughput.*

Résumé

Objectif *Notre centre a récemment mis en œuvre un nouveau modèle de soins ambulatoires qui comporte deux salles d'opération « en rotation » fonctionnant en alternance pour l'anesthésie régionale (SOR-AR) et gérées par un seul anesthésiologiste. Nous avons émis l'hypothèse qu'un tel modèle serait associé à une réduction du temps entre les cas et de meilleurs profils de récupération par rapport au modèle conventionnel d'une seule salle d'opération avec anesthésie générale.*

Méthode *Nous avons réalisé une étude de cohorte rétrospective portant sur 164 patients devant subir une chirurgie de la main et du poignet et traités dans les SOP-AR avec un bloc du plexus brachial, et nous avons comparé les résultats à un groupe témoin historique apparié de patients ayant subi une anesthésie générale dans une seule salle d'opération (SO-AG). Le critère d'évaluation principal était le temps entre les cas. Les critères d'évaluation secondaires comprenaient le temps*

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jusqu'au congé de l'hôpital, les interventions postopératoires pour traiter les nausées et vomissements, et le nombre de cas réalisables par journée de huit heures.

Résultats *Les patients du groupe SOR-AR ont eu moins de temps entre les cas que les patients du groupe SO-AG (moyenne [écart interquartile] : 15 min [8-22] vs 54 min [49-61], respectivement), et des temps jusqu'au congé plus courts ont été observés (28 min [20-46] vs 156 min [118-215], respectivement) (P < 0,0001). Dans le groupe SOR-AR, des antiémétiques postopératoires ont été administrés à 3/164 patients (2 %) vs 28/164 (17 %) dans le groupe SO-AG (P < 0,0001), et des opioïdes ont été administrés à 1/164 (0,6 %) vs 132/164 (80 %) patients, respectivement (P < 0,0001). Le nombre moyen de cas réalisables dans une journée était 56 % plus élevé dans le groupe SOR-AR que dans le groupe SO-AG (8,4 [7,5-9,4] vs 5,4 [5,1-5,8], respectivement; P < 0,0001).*

Conclusion *Par rapport à un modèle conventionnel ayant recours à l'anesthésie générale dans une seule salle d'opération, la mise en œuvre d'un modèle utilisant l'anesthésie régionale dans deux salles d'opération en rotation a été associée à une réduction du temps nécessaire entre les cas, de meilleurs profils de récupération et un volume plus élevé de cas traités.*

The use of regional rather than general anesthesia (GA) in extremity surgery has been associated with improved patient satisfaction and analgesia, reduced rates of postoperative nausea and vomiting, faster times to home discharge, and a reduced burden on resources in the postanesthesia care unit (PACU).[1-7] For these reasons, our centre, a tertiary care teaching hospital in Vancouver, British Columbia, has recently developed, implemented, and transitioned to a novel perioperative ambulatory care model focused on regional anesthesia for both upper and lower extremity surgery. The conception of this new care model by a multidisciplinary team, which includes anesthesiologists, surgeons, nurses, anesthesia assistants, and hospital administrators, led to the opening of the "Outpatient Department Surgical Procedure Rooms" in 2009. This model, hereafter referred to as the Regional Anesthesia-Swing Room (RA-SR) care model, consists of two stand-alone operating rooms (ORs) that are located in the outpatient wing of the hospital and are not directly associated with the hospital's main OR suite. In close proximity to these theatres is a three-bed Phase II PACU, which also serves as the area for preoperative admission as well as the ultrasound-equipped regional anesthesia "block room".

In the RA-SR model, all procedures are performed under peripheral nerve blockade or local anesthesia, with GA reserved as a backup rescue technique only. Patient eligibility for the RA-SRs includes upper or lower limb ambulatory surgery, patient approval for peripheral nerve blockade as the primary anesthetic technique, patient suitability for the procedure, age > 17 yr, and body mass index < 35 $kg \cdot m^{-2}$.

In the RA-SRs, care is provided by a single attending anesthesiologist experienced in ultrasound-guided regional anesthesia, one anesthesia assistant, a single attending surgeon, a surgical assistant, and four nurses. All anesthesiologists perform ultrasound-guided nerve blocks in the block room with the assistance of an anesthesia assistant or nurse. Patients are then transferred to one of the two RA-SRs where they are monitored by the anesthesia assistant while the anesthesiologist performs the block on the subsequent patient. A single surgeon operates in the RA-SRs sequentially. After completion of surgery, patients are transferred back to the block/recovery area where they are discharged to home after meeting the hospital's standard PACU discharge criteria.

In this study, our primary objective was to test the hypothesis that our RA-SR-based ambulatory care model would be associated with a decrease in turnover time for patients undergoing hand and wrist surgery when compared with a traditional model using GA with a single OR. As secondary objectives, we sought to test the hypotheses that such a care model would reduce the times to home discharge, reduce patients' total hospitalization times, and decrease the number of postoperative nursing interventions for nausea and pain. Finally, we postulated that the RA-SR model would be associated with an increase in the number of cases possible in an eight-hour day, which was calculated and projected based on measured median turnover and surgical duration times.

Methods

With approval from the Providence Health Care Research Ethics Board (Vancouver, B.C., Canada), we conducted a matched-pair historical cohort study based on a chart review of all patients treated during the first seven months of operations (February–August 2009) in the RA-SRs. The requirement for informed consent was waived by the Board. The data abstracted included type of surgery, anesthetic technique, type and doses of sedation, frequency of rescue GA, and frequency of PACU (Phase I) bypass. In addition, the following time intervals were abstracted: patient admission to OR entry, OR entry to surgical incision, surgical incision to surgical closure, surgical closure to OR exit, and OR exit to home discharge. We also recorded the incidence, dosing, and timing of all postoperative antiemetic and analgesic treatment.

Matching of controls

Using the hospital's administrative database, we matched all hand and wrist surgery cases performed in the RA-SRs under regional anesthesia (ultrasound-guided brachial plexus blockade; RA-SR group) with historical control cases completed previously in the main OR suite under GA (GA-OR group). Procedures were excluded for which any other form of anesthesia was used as the primary or initial technique. Matching criteria included an identical or very similar type of surgery, identical surgeon, and surgical duration $\leq$ 70 min. An attempt was made to match surgical procedures as closely as possible, i.e., identical anatomical location and surgical procedure. If exact matches were not available, we used the minimum acceptable matching criteria, i.e., the same anatomic location (e.g., phalanx surgery matched to phalanx surgery) and bony *vs* soft tissue surgery. We used the most recent historical control if more than one match existed. We recognized that some surgeons new to our institution would not have historical controls from the main ORs. In these events, matching was performed sequentially to one of three other surgeons who had worked regularly at both the RA-SRs as well as at the main ORs. In order to avoid surgical complexity as a possible confounding variable, we included the duration of surgery in the matching criteria.

Study endpoints

The primary endpoint was OR turnover time. This was defined as the time from the completion of surgical closure on one case until surgical incision on the following case. Secondary endpoints (definitions below) included block success rate, home discharge time, total hospitalization time, and the incidence of postoperative nausea or pain requiring treatment. Block success rate was defined as the fraction of cases in which GA was not required as a rescue technique. A GA was defined as any technique requiring advanced airway devices, such as a laryngeal mask or endotracheal tube. Discharge time was defined as the time from OR exit until home discharge. Total hospitalization time was the time from admission (first nursing assessment) until home discharge.

The median number of cases possible in a an eight-hour day (beginning with surgical incision on the first patient of the day) was based on individual turnover, surgical closure-to-OR exit times, and the observed median surgical duration and was calculated according to the formula below:

$$N = 1 + ([480 - S - C]/[S + TO])$$

where

N = number of cases possible in an eight-hour day;
1 reflects the fact that no turnover time is associated with the first case of the day;
480 = the number of minutes in eight hours;
S = median surgical time (based on the GA-OR group's surgical duration - for both groups to obtain a conservative calculation);
C = time from surgical closure until OR exit; and
TO = turnover time

We employed the above method to determine the number of comparable cases possible per day since actual RA-SR throughput was not directly measurable. The daily lists in these rooms frequently included cases involving minor peripheral surgery performed solely under local anesthesia administered by the surgeon. Since such cases do not reflect the ultrasound-guided brachial plexus anesthesia-based care model and are not comparable to the historical hand and wrist cases performed in the main ORs under GA, they were ineligible for inclusion (cf. above); moreover, inclusion in the analysis would have led to inflation of RA-SR throughput results.

Statistical analysis

We used descriptive statistics to summarize patient baseline demographic and surgical data. Approximately normally distributed data are summarized as mean (standard deviation - SD); skewed data are summarized as median [interquartile range - IQR]. The primary outcome variable was turnover time. Statistical analysis of time intervals was carried out with the Mann-Whitney test. We analyzed categorical data (e.g., PACU bypass, interventions for postoperative nausea and pain) with Fisher's exact test. All reported P values are two-sided and we considered values < 0.05 statistically significant. As the study endpoints related to the collective study cohorts, our analysis was based on group rather than subject-to-subject (matched pair) comparisons. The sample size was based on the maximum number of available matched pairs in the cohort; no calculated *a priori* sample size projection was performed. The data were analyzed using Prism Version 5 (GraphPad, San Diego, CA, USA) and Microsoft Excel version 2003 software (Microsoft Corporation, Redmond, WA, USA).

Results

During the months of February through August 2009, a total of 489 upper and lower extremity cases were completed in the RA-SRs. Of these, 249 underwent hand and wrist surgery under ultrasound-guided brachial plexus blockade; the remainder received local anesthesia

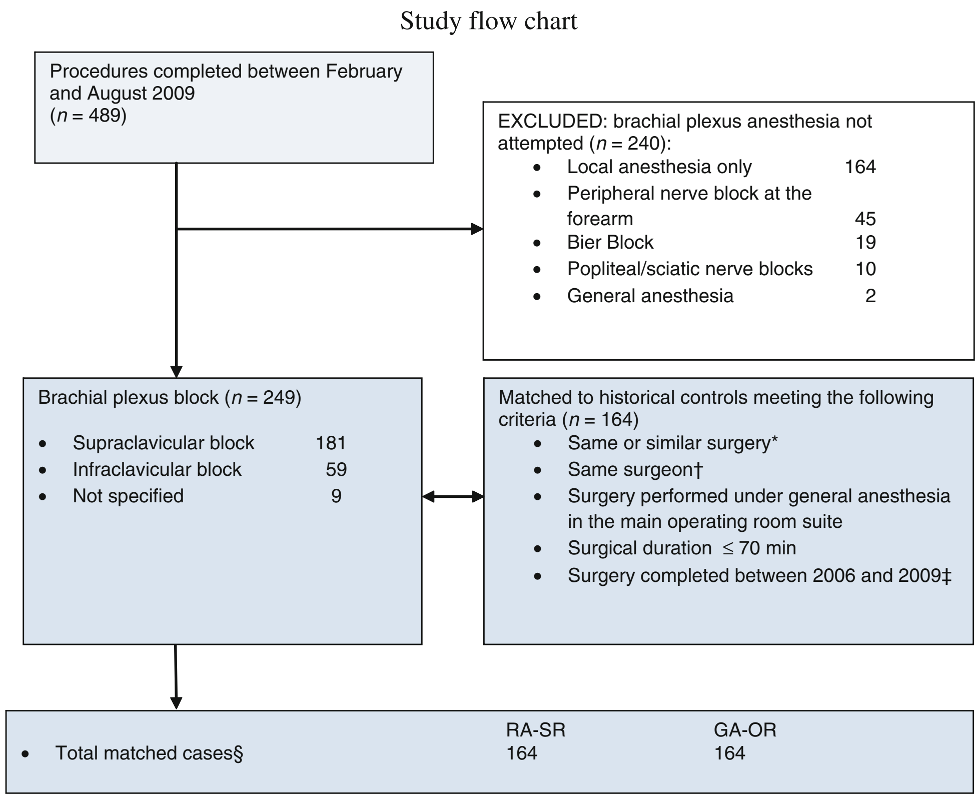

Figure Study flow chart. *An attempt was made to match surgical procedures as closely as possible, i.e., same anatomic location and same operation. If exact matches were not available, the minimum acceptable matching criteria were same anatomic location (i.e., phalanx, metacarpal, or wrist) and bony *vs* soft tissue surgery. †For some surgeons operating in the Outpatient Department Surgical Procedure Rooms, no historical controls were available from the main operating room (OR) suite. In these cases, matching was performed to cases of one of three possible surgeons who had worked regularly in both settings. ‡If more than one match existed, the most recent historical control was used. RA-SR = hand and wrist surgery patients treated in the swing room model under regional anesthesia (brachial plexus blockade); GA-OR = matched control patients treated in the traditional OR under general anesthesia. §For various study endpoints/outcome variables, $n < 164$ as a result of i) missing chart data, and ii) non-existing turnover times in patients who represented the first case of a day

($n = 164$), forearm blockade ($n = 45$), intravenous regional anesthesia ($n = 19$), popliteal blockade ($n = 10$), or GA ($n = 2$). Of the 249 patients receiving brachial plexus blockade, 164 were matched successfully to historical control cases. Unavailable matches were due to matching data that were available only as far back as 2006. Depending on the outcome variable studied, the available group sample sizes were < 164 as a result of missing chart data; for example, calculation of turnover times could not be made for the first case of each day. The Figure provides a study flow chart.

The matching protocol produced groups that were similar with regard to patient demographics as well as the type and duration of surgical procedures (Table 1). Most patients received light sedation for block placement and no sedation intraoperatively (Table 2). The block success rate in the RA-SR group was 99.4%, with rescue GA required in only one patient. The rate of PACU bypass was 98% (161/164). All patients in the GA-OR group recovered in the PACU.

Patients in the RA-SR group had markedly shorter OR turnover times than those in the GA-OR group (Table 3). In the RA-SR group, 10% (14/141) of patients with available data had negative turnover times (reflective of the fact that, in some cases, the RA-SR model allowed surgeons to start procedures on a patient while their assistant completed surgical closure on the previous patient), and in the GA-OR group, there were no patients with negative turnover times ($P = 0.0001$). Regarding the secondary outcome variables, home discharge time and total time spent in hospital were shorter in the RA-SR group compared with the GA-OR group (Table 3). Postoperative antiemetics were given to 17% (28/164) of patients in the GA-OR group in the PACU compared with 2% (3/164) of patients in the RA-SR group ($P < 0.0001$). Similarly, all GA-OR patients received opioids intraoperatively and 80% (132/164) of them required rescue opioid analgesic treatment in the PACU compared with 0.6% (1/164) of patients in the RA-SR group ($P < 0.0001$). No patient in either group required readmission for pain.

Table 1 Patient demographic and surgical data

	RA-SR ($n = 164$)	GA-OR ($n = 164$)
Male sex	94 (57%)	91 (55%)
Age (yr)	47 (18)	45 (17)
Body Mass Index ($kg \cdot m^{-2}$)	25 (4)	25 (5)
ASA physical status		
I or II	145 (88%)	146 (89%)
III or IV	19 (12%)	18 (11%)
Surgical time (min)	36 [24–54]	43 [30–57]
Type of surgery		
Fracture fixation	43 (26%)	38 (23%)
Fasciectomy/Dupuytren’s/capsulolysis	17 (10%)	24 (15%)
Tendon	10 (6%)	17 (10%)
Arthroplasty	6 (4%)	13 (8%)
Joint reconstruction	15 (9%)	15 (9%)
Tumour/mass removal/biopsy	14 (9%)	12 (7%)
Joint fusion/arthrodesis	9 (5%)	2 (1%)
Arthroscopy	10 (6%)	6 (4%)
Hardware removal	7 (4%)	6 (4%)
Miscellaneous	33 (20%)	31 (19%)

ASA = American Society of Anesthesiologists; RA-SR = hand and wrist surgery patients treated in the swing room model under regional anesthesia (brachial plexus blockade); GA-OR = matched control patients treated in the traditional operating room under general anesthesia; Miscellaneous: carpal tunnel release, debridement, carpectomy, osteotomy, bone grafting, ligament repair, nerve repair, etc.

Categorical data are expressed as *n* (%); continuous variables are represented as mean (standard deviation), with the exception of surgical time, which is expressed as median [interquartile range]

Table 2 Sedation administered to RA-SR patients during blockade and intraoperatively ($n = 164$)

	During blockade		Intraoperatively	
	Number (%)	Median dose* [IQR]	Number (%)	Median dose* [IQR]
Midazolam	137 (84)	1.5 [1–2] mg	41 (25.2)	1 [1–1.25] mg
Fentanyl	80 (49)	50 [50–50] µg	27 (16.6)	50 [25–75] µg
Sufentanil	8 (5)	5 [5–5] µg	2 (1.2)	7.5 [5–10] µg
Ketamine	5 (3)	20 [15–20] mg	1 (0.6)	15 [15–15] mg
Remifentanil bolus	0 (0)	–	2 (1.2)	30 [10–15] mcg
Propofol bolus	0 (0)	–	6 (3.7)	20 [20–35] mg
Propofol infusion	0 (0)	–	47 (28.9)	50 [32.5–75] $\mu g \cdot kg^{-1} \cdot min^{-1}$

RA-SR = hand and wrist surgery patients treated in the swing room model under regional anesthesia (brachial plexus blockade); IQR = interquartile range

* Data provided for patients who received the medication in question

Table 3 Primary and secondary endpoints: turnover time and perioperative time intervals in minutes

	RA-SR	*n*	GA-OR	*n*	*P* value
OR turnover time	15 [8–22]	141	54 [49–61]	129	<0.0001
Home discharge time	28 [20–46]	153	156 [118–215]	162	<0.0001
Total time spent in hospital	186 [153–224]	134	345 [290–430]	133	<0.0001
Hospital admission to OR entry	70 [54–94]	153	92 [56–145]	104	0.001
OR entry to surgical incision	20 [15–27]	164	24 [20–27]	162	0.0001
Wound closure to OR exit	5 [3–8]	156	7 [5–9]	157	0.0001

All time intervals are expressed in minutes as median [interquartile range]; n = sample size of cases with data available for analysis.*Ten per cent of patients in the RA-SR group had negative OR turnover times. OR = operating room; RA-SR = hand and wrist surgery patients treated in the swing room model under regional anesthesia (brachial plexus blockade); GA-OR = matched control patients treated in the traditional OR under general anesthesia. *Sample sizes with $n < 164$ were a result of i) missing chart data for study variables, and ii) non-existing turnover times in patients who represented the first case of a day

We compared other perioperative time intervals, including the time from hospital admission until OR entry, the time from OR entry until surgical incision, and the time between wound closure and OR exit. All time intervals were shorter for patients in the RA-SR group than for patients in the GA-OR group (Table 3).

Based on the formula stated earlier and applying the GA-OR group's median surgical time of 43 min (Table 1) to both groups to obtain a conservative calculation, the median number of comparable cases possible in an eight-hour day was 8.4 [IQR, 7.5-9.4] for the RA-SR group *vs* 5.4 [IQR, 5.1-5.8] for the GA-OR group ($P < 0.0001$). This represents a median increase in OR throughput of three cases per day (56%) in the RA-SR group**.** This increase would have been even greater had the RA-SR group's measured median surgical time of 36 min been used for calculation. Moreover, the calculation does not include the time required to recover and discharge the final patient of the day, which averaged 28 min and 156 min for the RA-SR and GA-OR groups, respectively. Had this final recovery time been included, the magnitude of the difference between the two groups would again have been even greater (7.9 cases per day [7.1-8.8] *vs* 3.8 cases per day [3.6-4.0], respectively, corresponding to a 108% increase in OR throughput).

Discussion

With respect to hand and wrist surgery at a Canadian tertiary care hospital, our study shows that the implementation of a novel "swing room" care model based on regional anesthesia reduced room turnover, reduced patient home discharge times, decreased the frequency of postoperative interventions for nausea and pain, was associated with a 98% rate of PACU bypass, and produced an increase in case throughput by at least 56% compared with a traditional model based on GA in a single OR.

The high success rate (99.4%) for surgical anesthesia among RA-SR patients was likely a result of several factors. First, blocks were administered in a dedicated area with ample time for blocks to work. Second, patients presumed to be at high risk for block failure (i.e., necessity to convert to GA) were excluded (e.g., age < 18 yr, uncooperative, body mass index $> 35\ \text{kg·m}^{-2}$). Third, all blocks were performed under ultrasonic guidance by experienced regional anesthesiologists. It is unknown how integration of anesthesiology trainees into the model would have affected our results. Given the favourable conditions for block success noted above, RA-SR patients generally required minimal intraoperative sedation, resulting in a very high rate of PACU bypass.

Our results indicate that the mean number of comparable cases completed in an eight-hour day is increased significantly when patients are treated in the context of the RA-SR model compared with the traditional GA-OR model. These findings contrast with those of Dexter *et al.*[8] who found that anesthesia-controlled time (ACT; or the time from surgical closure on one patient until anesthesia is ready on the following patient) for most types of surgeries would have to be decreased by more than 100% in order to be able to book one additional 30-min case each day. However, this was a single surgeon-single OR model and included a heterogeneous group of procedures, including abdominal and cardiac surgery for which surgical duration is much longer than in our study. If surgical times far exceed turnover times, it would be expected that the overall time savings from turnover time reductions would not be significant. The use of parallel processing, whereby a patient receives a peripheral nerve block in a dedicated block room while the previous patient is undergoing surgery in the OR, has previously been shown to decrease ACT.[5,9,10] A reduction in ACT alone, however, does not necessarily result in decreased turnover time, which is dependent on other factors, including OR cleaning, equipment sterilization, as well as nursing and surgeon responsibilities (e.g., surgical site marking, consent verification, patient positioning).[5,9–11]

Our model, on the other hand, used *two* forms of parallel processing, i.e., a block room to facilitate early placement of brachial plexus anesthesia and two ORs. The result was a marked reduction in OR turnover times and an increase in case throughput, which has not been demonstrated in these previous studies. We recognize that our model would not be reproducible in hospitals without the resources necessary to operate a dedicated block room.

Although our study was not intended or designed to include a detailed economic analysis, other authors have examined this aspect of regional anesthesia and the published findings are conflicting. In a study of hospital costs following anterior cruciate ligament reconstruction at a United States tertiary care hospital, PACU bypass resulted in a cost savings of $420 per patient.[12] Others have pointed out that PACU costs are highly dependent on maximal workload, suggesting that actual cost savings will occur only if the number of PACU beds (i.e., nurses) is reduced.[13] In a retrospective study, Schuster *et al.* estimated brachial plexus anesthesia to represent a cost disadvantage of 19% over GA.[14] This study, however, did not factor in potential PACU cost savings and included no form of parallel processing, i.e., block room or "swing" OR.

In terms of nursing resources, our RA-SR model employed four nurses for combined OR and PACU care. Given a projected mean number of 8.5 cases possible in an eight-hour day, this represents 2.1 cases per nurse per day. This compares favourably with the 1.7 cases per nurse per day completed for the GA-OR group (based on a staffing ratio of 3.25 nurses per OR and a projected case load of 5.5 cases per day).

An obvious limitation of this study is its retrospective nature. Although our data show a strong association between the anesthetic technique and measured outcome variables, our results were likely due not only to the anesthetic technique *per se* but also to a product of a system redesign. In this regard, it is likely that the RA-SR model (as opposed to the traditional single OR model) and the use of regional anesthesia (as opposed to GA) affected our study outcomes differentially; whereas we would anticipate that the reduction in turnover time and increase in case throughput were mainly a result of the RA-SR model, the effects on postoperative recovery were likely related to the choice of regional anesthesia. Moreover, we selected as our control group a cohort of patients who were managed *via* a traditional model in a single OR under GA only. We deliberately excluded patients who underwent regional anesthesia for two reasons. First, since our primary endpoint was OR turnover time, we anticipated patients undergoing regional anesthesia in a traditional single anesthesiologist-single OR model to have exaggerated turnover times due to the increased time necessary both to perform brachial plexus blockade in the OR and to allow for sufficient time to achieve surgical anesthesia. Second, somewhat related to this, a majority of our historical cases were performed under GA. Another limitation in our study was not being able to measure case throughput directly, because 240 of the 489 cases completed in the RA-SRs were performed under a form of anesthesia other than brachial plexus blockade (Figure); therefore, we calculated this variable based on measured turnover times and surgical durations.

For some, a potential concern regarding the RA-SR model might be a possible deviation from the Canadian Anesthesiologists' Society *Guidelines to the Practice of Anesthesia—2011*, which state that "Simultaneous administration of general, spinal, epidural, or other major regional anesthesia … by one anesthesiologist for concurrent diagnostic or therapeutic procedures on more than one patient is unacceptable".[15] Although our care model necessitated that the attending anesthesiologist administered the brachial plexus block on one patient while another patient was undergoing surgery, we believe that it is safe for the following reasons: First, our model represents a single surgeon-single anesthesiologist approach to care, i.e., generally, therapeutic procedures were not running concurrently. Second, RA-SR patients received little or no sedation in the OR, and they were monitored continuously by qualified anesthesia assistants or anesthesiologists. In the rare event that GA or heavy sedation was required, no further blocks were completed, and the anesthesiologist remained with the anesthetized patient. Third, the block room was designed to be located in close proximity to the "swing" ORs (< 5 m away) and features patient monitors from both rooms. On the basis of these unique circumstances and provisions as well as our experience, it is our view that the RA-SR model is safe and demonstrates the unique contributions that anesthesiologists can make in improving patient care and perioperative efficiency.

Finally, a shortcoming of this study is the lack of systematically collected data regarding patient satisfaction or potential adverse sequelae of the techniques involved. However, consistent with our experience and the results of others is the finding that these regional anesthesia techniques are associated with high degrees of patient satisfaction and are safe.[2,3,16] At present, we are planning to develop a comprehensive regional anesthesia database for our centre that would include this type of data.

In summary, with respect to selected patients undergoing hand and wrist surgery at a Canadian tertiary care hospital, the present study shows that the implementation of an ultrasound-guided peripheral nerve block program in association with a two-theatre "swing" room model has been associated with a significant reduction in OR turnover and patient home discharge times, a high rate of PACU bypass, a marked decrease in the frequency of PACU interventions for nausea and pain, and a significant increase in case throughput.

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Conflict of interest None declared.

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